3.4 Solve by Factoring
Word Problems p 163 q#13

The manager of a hardware store knows that the weekly revenue function for batteries sold can be modeled with

$R(x) = -x^2 + 200x + 30\,000$

where both the revenue (R(x) and price x of a package of batteries are measured in dollars. According to the model, what is the maximum revenue the store will earn?

Mar 9-9:15 AM

$R(x) = -x^2 + 200x + 30\,000$

$R(x) = -(x^2 - 200x - 30\,000)$

$R(x) = -(x^2 - 300x + 100x - 30000)$

$R(x) = -[x(x-300) + 100(x-300)]$

$R(x) = -[(x-300)(x+100)]$

300 −100

A | M
200 | −30 000
−300 +100

Mar 9-9:22 AM

Substitution to find y-vertex

$R(x) = -x^2 + 200x + 30\,000$

$\boxed{\frac{s+t}{2}}$

$\frac{300 + (-100)}{2}$

$= \frac{200}{2}$

$x = 100$

$R(x) = -[(x-300)(x+100)]$

$R(100) = -[(100-300)(100+100)]$

$R(100) = -[(-200)(200)]$

$R(100) = -[-40\,000]$

$R(100) = 40\,000$

The max revenue is $40000 when you sell packages for $100

Mar 9-9:26 AM

10) $P(x) = 324x - 54x^2$ p.162

$P(x)$ = 1000s of dollars x = 1000s of snowboards

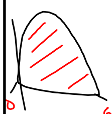
Break Even

Be Profitable

$P(x) = -54x^2 + 324x$

$= -54x(x-6)$

0   6



The company breaks even at 0 and 6000 snowboards.

The company is profitable b/n 1 and 5999

$\frac{s+t}{2}$

$\frac{6+0}{2}$

$= 3$

$R(x) = -54x^2 + 324x$

$R(3) = -54(3)^2 + 324(3)$

$= -54(9) + 972$

$= -486 + 972$

$R(3) = 486$

$(3, 486)$

When they sell 3000 snowboards they will make a max profit of $486 000

Mar 9-10:01 AM

11. A rock is thrown down from a cliff that is 180 m high. The function $h(t) = -5t^2 - 10t + 180$ gives the approximate height of the rock above the water, where $h(t)$ is the height in metres and t is the time in seconds. When will the rock reach a ledge that is 105 m above the water?

Oct 11-11:20 AM

11 $h(t) = -5t^2 - 10t + 180$

$105 = -5t^2 - 10t + 180$

$0 = -5t^2 - 10t + 180 - 105$

$0 = -5t^2 - 10t + 75$

$0 = -5(t^2 + 2t - 15)$

$0 = -5(t+5)(t-3)$

−5   +3

A | M
+2 | −15
+5 −3

(−5, 105) (3, 105) ROOTS

At 3 seconds the rock is 105m above the ground.

Mar 9-9:53 AM

p 162-163

q. 9,12, 14, 15

#9

$A(w) = -2w^2 + 48w$

$0 = -2w(w-24)$

0 24

$\frac{0+24}{2}$

$x_v = 12$

Sub) $A(w) = -2(12)(12-24)$

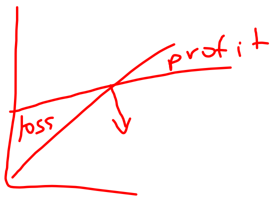
$= -24(-12)$

$= +288$

The max area of the fence is $288\,m^2$ with a width of 12m.

Mar 9-9:27 AM

14



Profit = Rev - Cost

$\text{Profit} = [-5x^2+21x] - [2x+10]$

$= -5x^2+21x-2x-10$

$P(x) = -5x^2+19x-10$

Mar 9-10:04 AM